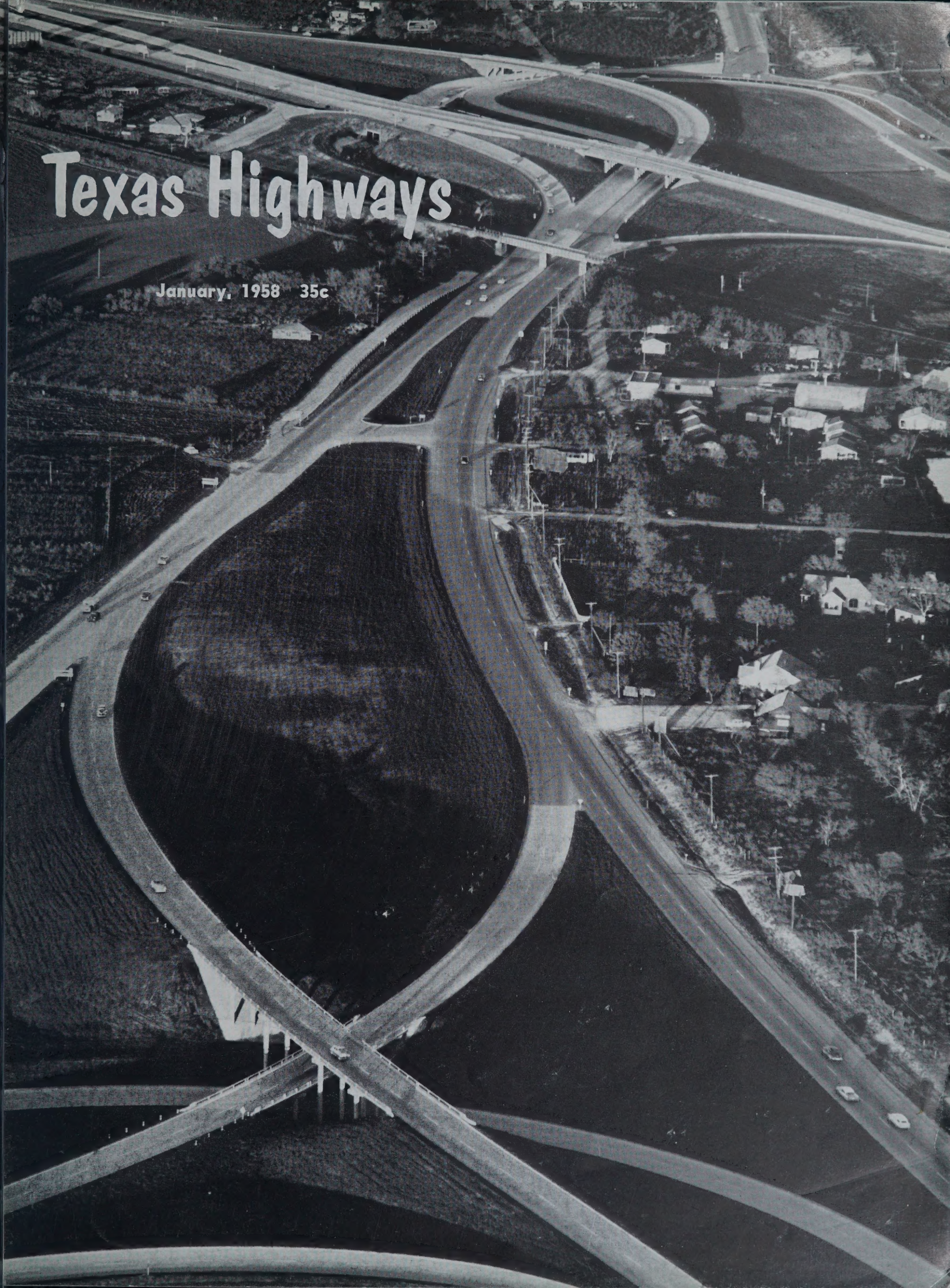
Texas Highways

January, 1958 35c



Yucca plant beside U.S. 183
between Cuero and Gonzales.

Texas Highways

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Construction of the High Bridge

Lewis H. White, Senior Field Engineer
District 16

THE first contract on the Corpus Christi High-level Bridge was completed October 28, 1957. This contract was for 2,000 feet of bridge, complete except for the railing, and consisted of 37 prestressed concrete girder spans. There were many problems on this project which were new to both Highway Department personnel and the contractor.

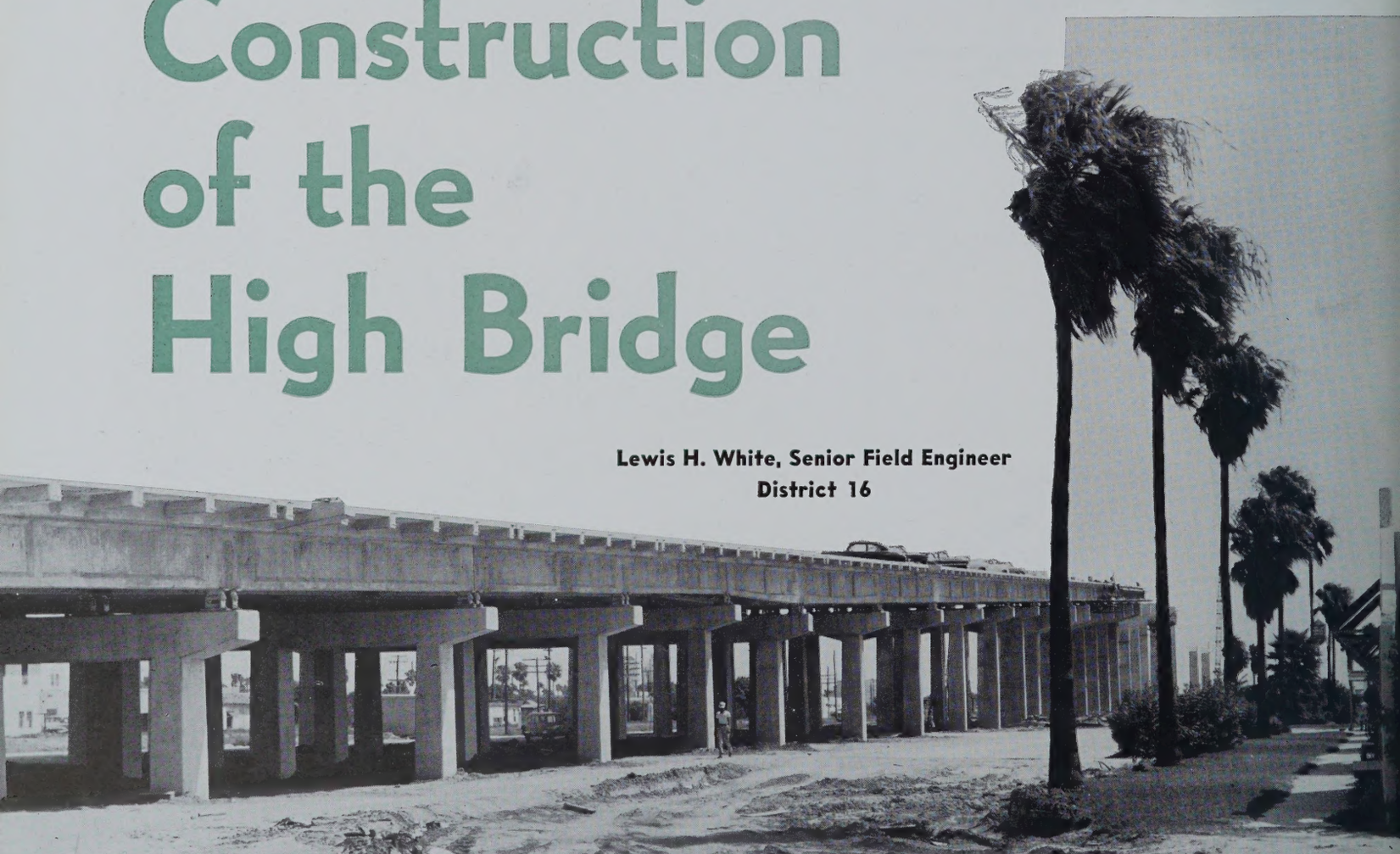
The contractor had his choice of regular precast concrete piles, prestressed concrete piles, or metal shell piles. Seventeen-inch prestressed concrete piles were selected on the basis of cost and proved to be very satisfactory to all concerned. They were very tough, withstood a great deal of hard driving, and were much easier to handle than regular concrete piles.

Casting of these piles turned into a simple assembly-line operation once the initial problems were ironed out. The contractor set up a casting bed 500 feet long and five lines wide. This made it possible to cast one line, or approximately 480 feet of piling a day.

The first problem encountered was calibration of jacking equipment, as the ram was too large to be calibrated by the local testing laboratories. This was solved by checking the stress in the jack rods with a Whittemore Strain Gauge with the cable deformation and a calibrated pressure gauge as secondary checks. Professor Raymond F. Dawson, of the University of Texas, has calibrated the jacking equipment on several later jobs with an electric load cell. This is much simpler than our method.

The next problem was to get a workable concrete which would give strengths of 5,000 p.s.i. at 28 days. The most satisfactory concrete design used was—cement, 6.75 bags per cubic yard; water, 5.35 gallons per bag; coarse aggregate factor, 71.6; and fine aggregate factor, 73.9. The slump was one and one-half inches to two inches and required careful vibration with two vibrators to get proper consolidation of the concrete. The forms were filled in two layers, the first layer poured 50 to 75 feet ahead and vibrated before the second layer was placed. This method assured better vibration and elimination of honeycomb, and made accurate gauging possible in the amount of concrete required to exactly fill the form. This reduced the amount of hand-shoveling required.

On almost 100 per cent of the pours, curing with mats and water gave the required strengths to permit



Completed prestressed girder spans, lacking only a final finish, on north end of Corpus Christi High Bridge. . .

release of the cables in the minimum five days. This curing then continued five more days.

The prestressed concrete girders undoubtedly presented the most problems. On this contract, there were 130 forty-foot girders, 200 sixty-foot girders, and 40 seventy-foot girders. These were post-tensioned, and the contractor chose the Prestress Incorporated, or P I, system of stressing which uses a bundle of one-fourth-inch high-strength wires with double upset heads on the ends (one head for pulling, the other for anchorage).

Accurate placing of the flexible metal tubes through which the stressing wires are later run is essential. After the tubes were placed and tied to the reinforcing steel, we used a three-quarter-inch pipe run through the tube during the concreting operation to stiffen the tube and make sure it did not get badly out of line while the concrete was being vibrated.

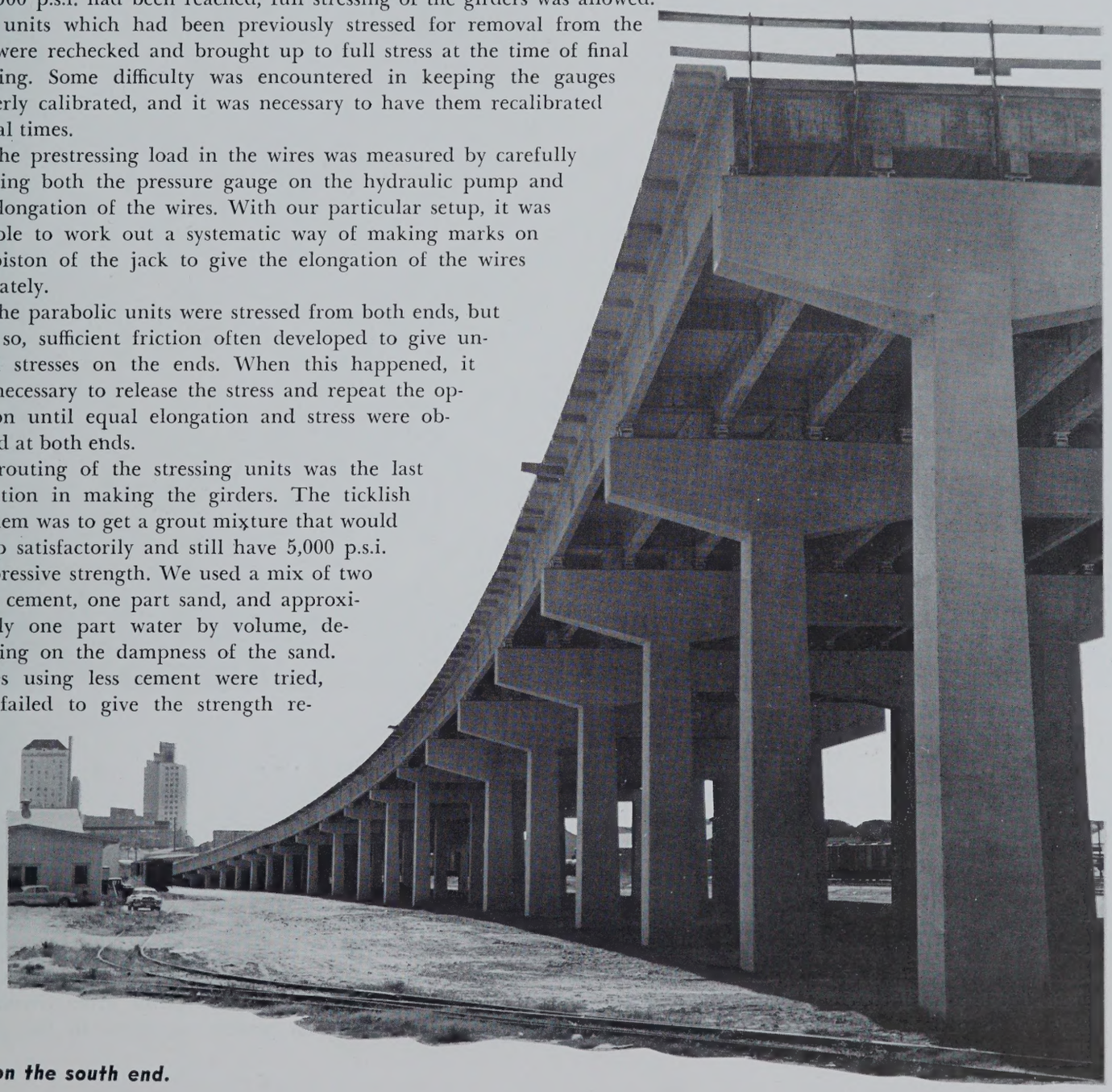
Very complete and careful vibration of the concrete was required and was quite difficult as the metal tubes and reinforcing steel left only a small clearance to work the concrete. Because of this, we increased the cement to seven sacks per yard and used a two to two and one-half-inch slump. Otherwise, the batch design was approximately the same as used in the piling.

After the concrete reached a compressive strength of 3,500 p.s.i, partial stressing was allowed to move the girders from the casting beds. To accomplish this, half of the units were stressed. After fourteen days, when a strength of 4,500 p.s.i. had been reached, full stressing of the girders was allowed. The units which had been previously stressed for removal from the bed were rechecked and brought up to full stress at the time of final stressing. Some difficulty was encountered in keeping the gauges properly calibrated, and it was necessary to have them recalibrated several times.

The prestressing load in the wires was measured by carefully checking both the pressure gauge on the hydraulic pump and the elongation of the wires. With our particular setup, it was possible to work out a systematic way of making marks on the piston of the jack to give the elongation of the wires accurately.

The parabolic units were stressed from both ends, but even so, sufficient friction often developed to give unequal stresses on the ends. When this happened, it was necessary to release the stress and repeat the operation until equal elongation and stress were obtained at both ends.

Grouting of the stressing units was the last operation in making the girders. The ticklish problem was to get a grout mixture that would pump satisfactorily and still have 5,000 p.s.i. compressive strength. We used a mix of two parts cement, one part sand, and approximately one part water by volume, depending on the dampness of the sand. Mixes using less cement were tried, but failed to give the strength re-



and on the south end.

An aerial perspective of bridge, looking north . . .

quired consistently.

Tests were also run to establish a required mixing time for the grout. This will, of course, vary with the mixer, but in a small concrete mixer, mixing times of from six to ten minutes were needed. By getting a plaster mixer with paddles (which did a much better job of mixing in less time), this operation was accelerated.

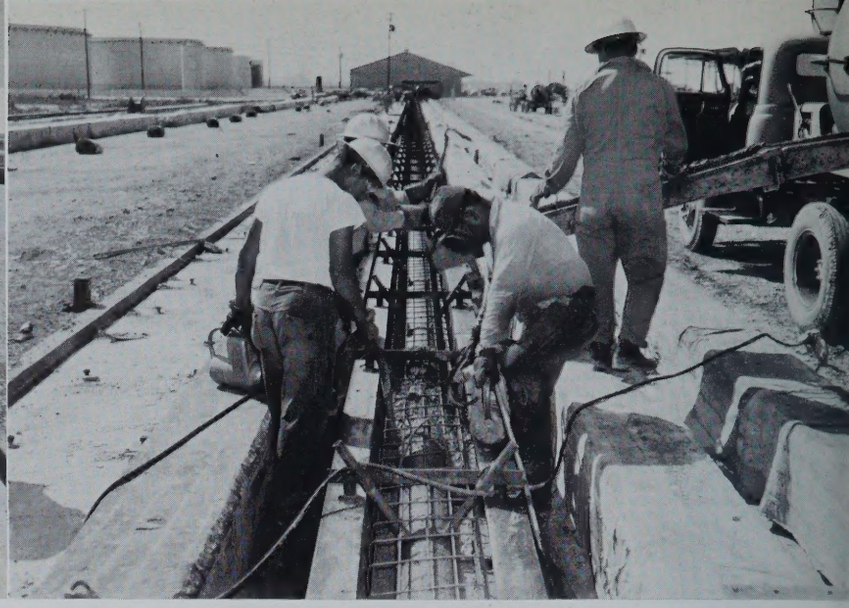
Another problem in grouting was entrapping air in the tubes. This was helped by making a small notch in the end anchorage shims which allowed the air to escape at the high point. In grouting, we found it necessary to keep the grout circulating to prevent stoppages in the pump

and lines. As the contractor's crew gained experience, they were able to reduce the trouble from plugged lines but it was never eliminated.

We found that girders should be cast a little long to allow for shrinkage caused by stressing. This was about one-fourth inch for the 40-foot girder, three-eighths inch for the 60-foot girder, and one-half inch for the 70-foot girders. The girders would deflect upward after stressing. This was approximately one-fourth inch for the 40-foot girders, one-half inch for the 60-foot girders, and three-fourths inch for the 70-foot girders. Both the shrinkage and upward deflection will vary with the age and

and south.

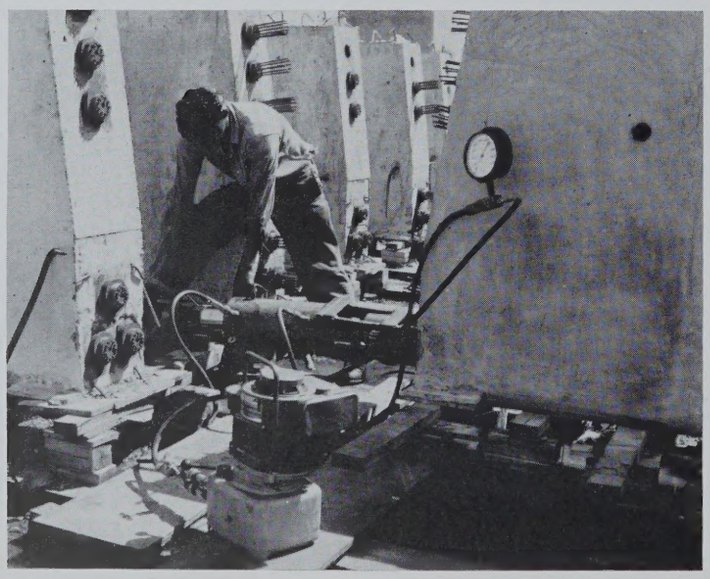
Concrete is placed in prestressed piling . . .



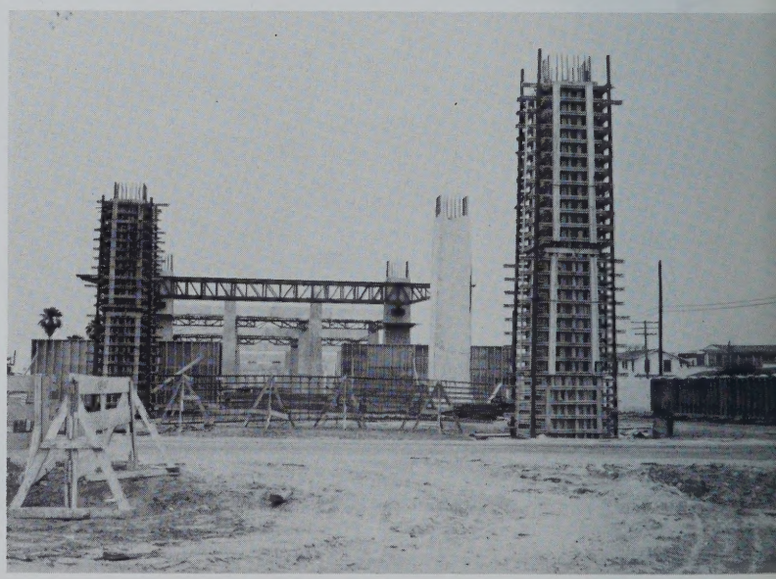
. . . and vibrated.

Trusses used to support cap forms . . .

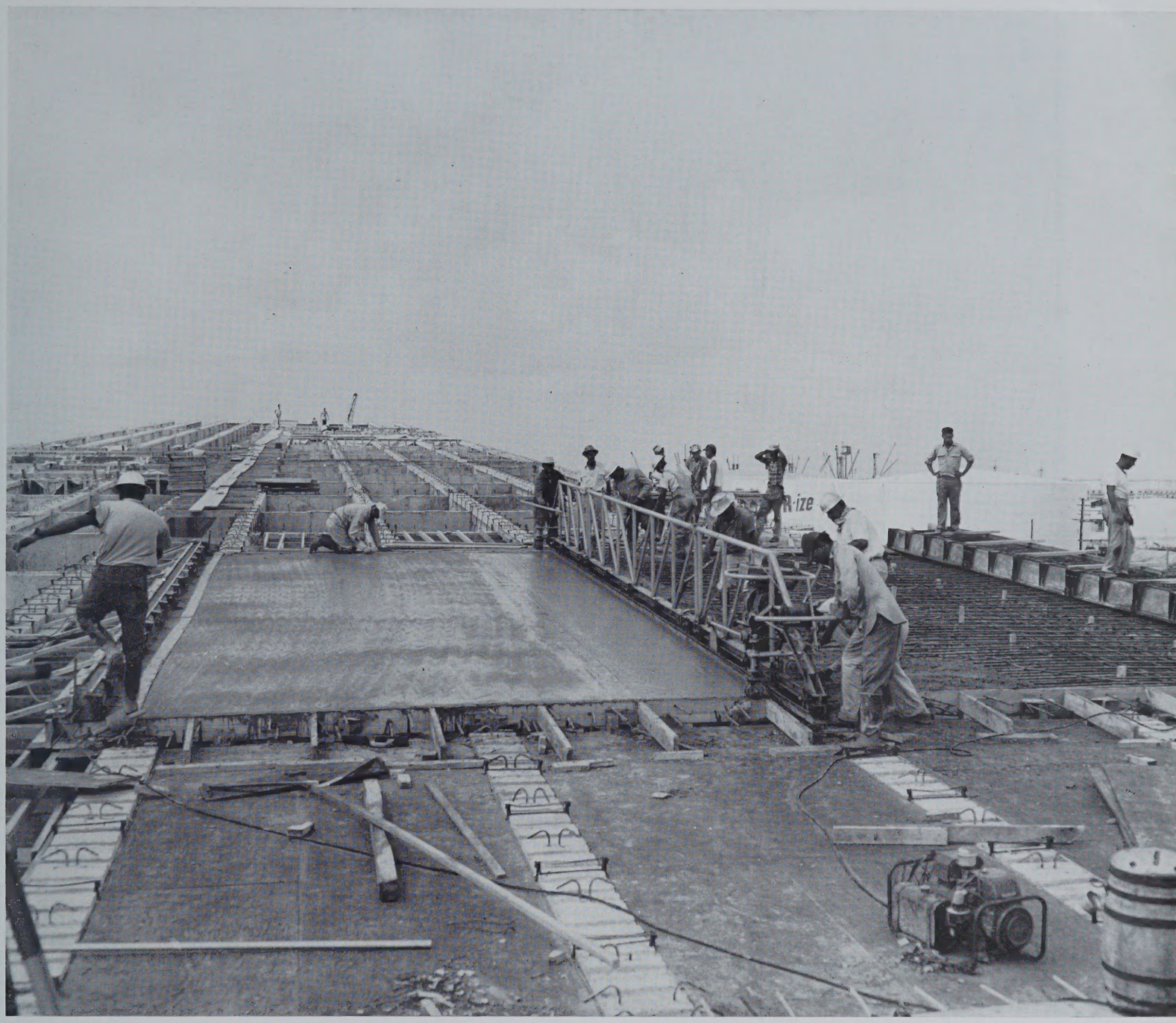
. . . which are waiting for concrete.



Elongating prestressing units on 60-foot girders.



Forms for columns used in bridge.



Slab finishing is in progress using mechanical screed.

strength of the concrete at the time of stressing.

Two other items of interest are the trusses used to support the cap forms and mechanical screed. The trusses are supported by two two-inch bolts run through each column. Holes were made by placing greased pipes in the columns. These pipes were removed as soon as the concrete had set. Use of these trusses eliminated costly and uncertain falsework supports, some of which had been very tall, and in addition, facilitated grading and leveling of the cap forms.

The mechanical screed was very satisfactory. The engine operates the screed bar longitudinally and it is moved transversely across the roadway by hand winches on each end. It is advisable to have a spare engine ready for a quick change in case of difficulty, as it is too heavy to operate by hand. Depending on how carefully the concrete was dumped, two to four passes of the screed leveled each strip of nine to twelve feet accurately. A bull float took out occasional bad spots, and a careful straight-edging and belting completed the finishing operation.

VOUCHERS

That man loves machines to accelerate and simplify his work is a well-known fact, borne out by the increasing number of such devices appearing in offices and businesses everywhere. The Highway Department has its share of such machines. One of its most recent innovations, purchased by the Aid Division, is a National Cash Register Company Class 32 combination electric typewriter and accounting machine.

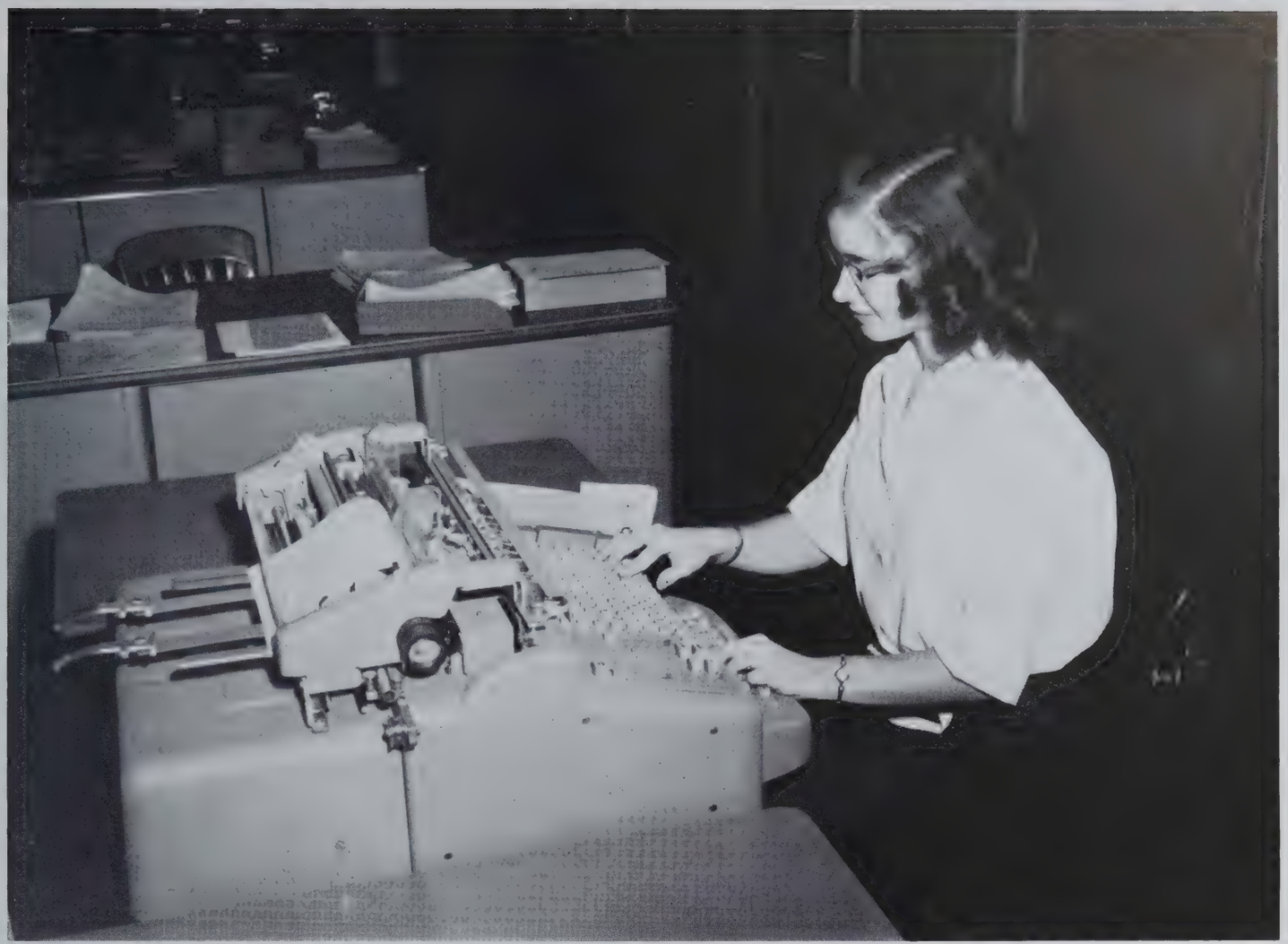
By expediting payment to contractors, through rapid processing of contract vouchers, use of the machine tends to encourage lower bidding by contractors. It does so by making it possible for contractors to liquidate operating capital borrowed from a bank a few days sooner than was possible before installation of the machine, thus reducing the amount of interest on the money. The lower the operating cost, the lower the bid, since contractors base their bids on past experiences and figures.

The machine itself is a substantial improvement over that which was used by the Aid Division in the past. The new machine automatically checks its work, eliminating detailed checking by both the Aid and Accounting Divisions. It thus makes it possible for vouchers to be prepared much faster. In fact, payments can now be made to contractors each month from one to five days earlier than before.

According to Harvey Deen, Engineer of Aid Projects, the Texas Highway Department is one of the first organizations to use the machine. Credit for its purchase belongs to Deen and Stroud McIvain, Contract Estimate Assistant.

Between the fourth and seventh day of each month, the bulk of the intermediate estimates, plus some final vouchers, pour into the Aid Division from field engineers, giving the machine its most extensive workout. At that time, perhaps 200 or 300 vouchers per day are processed, totaling from twelve to fourteen million dollars. For the rest of the month, perhaps 200 or 300 more vouchers, mostly final estimates representing some four to eight million more dollars are received and processed. Figuring on a 5 per cent interest basis, it is evident that the interest saved by contractors receiving warrants one, two, three, or four days earlier adds up to an impressive amount when taken collectively.

Preparing of vouchers and the ultimate issuance of warrants, facilitated by the combined typewriter-calculator machine, is an involved process. From the field engineer's calculations of the work performed by the contractor, estimates, final and intermediate, are prepared by members of the Aid Division. "Snap-out" vouchers, also designed to facilitate the process, are slipped into the machine, which does automatically most of the computation formerly done by hand. First, the total amount of work done is entered into the machine, and then, the 10 per cent retainage. After the 10 per cent figure is automatically printed and subtracted from the total amount of work, special deductions are entered, printed, and subtracted from the previous subtotal. Previous payments are thrown next into the cycle to thus secure the figure representing the total amount payable to the contractor by the voucher. Distribution of this amount to the various funds (such as Federal, State, County, and City) is entered into the machine. To prove that the distribution equals the amount shown on the voucher, two zeroes appear on the lower half of the voucher's face. This is the automatic check. If the zeroes are not printed, then it is clear



A voucher is processed in the new electric typewriter-accounting machine by Jane Touchstone, one of the three operators in Aid Division. Faster processing by D-7 means earlier payment to contractors on intermediate and final vouchers. For some, this will mean a few days of interest saved on thousands of dollars.

that a mistake has been made in calculation or typing.

After the voucher has been prepared by the Aid Division, Deen signs the voucher, which is then notarized, approved by R. J. Hank, Administrative Head, and audited by the Accounting Division. Having been cleared by the Highway Department, the voucher is sent to the State Comptroller, who issues a warrant. In turn, the Comptroller passes it on to the State Treasurer, who audits the account and signs the warrant. As soon as it is returned to the Aid Division, Deen immediately has it mailed to the contractor. No warrant is ever held overnight by the Department.

Vouchers are based upon the preceding month's work. Various elements—weather, availability of materials—influence the amount earned by the contractors each month. Through the years, records show that August and September are the heaviest months for processing vouchers, while February and March are the lightest. To date, the least ever paid to contractors was February, 1944, for $200,000. Tops in the category for largest total amount paid to contractors is that of September, 1957, for $21,825,000. Individually, the greatest amount ever paid one contractor for a final estimate is $544,034.36 in January, 1952; and for an intermediate estimate, $420,271.13, in August, 1957. Photostatic copies of both these record-holding checks are framed and hang on Deen's office wall.

During the 22 years Deen has been overseeing the processing of vouchers, the soft-spoken, blue-eyed man has signed his name to approximately 79,000 pink-sheeted documents. Though preparation of most of the contract vouchers is routine, none of it seems dull to Deen, who says "There is something different and interesting about each problem."

No doubt, though, he will probably agree that work for both him and his division will now be easier as well as interesting—with the rapid-writing electric typewriter.

Pioneer Road Builders

Alton W. Vordenbaum, Senior Right of Way Agent
District 15

The first road builders were probably wild animals that made well-defined trails as they traveled from their feeding grounds to water holes. Men followed these animal trails to hunt game, and also left their own trails as they searched for water, food, and fuel. Early explorers followed tracks left by natives hundreds of years before.

In Europe, there are some roads so old that their true age is not known. The ancient Egyptians, Carthaginians, Etruscans, and Persians built roads, but the first great road builders were the Romans. They gave the road a solid base and built a pavement of flat rock. They also gave it a crown to drain off the water and ditches to carry it away. Some Roman-built roads are still in use today although many centuries old. The ancient builders had ample man power, often in the form of slave labor, to accomplish what they set out to do.

Road builders of today have funds, well-trained man power, fine materials, and efficient machinery with which to build the marvelous highways of this modern age.

With today's mechanized road-building processes, we sometimes forget what a struggle it was for the men of three-quarters of a century ago to build those terrible roads we joke about now.

Not many years ago, however, our forefathers had only a few simple tools and practically no funds for building and maintaining the roads in our state. Referred to is the era when once a year each property owner worked on the county roads in his area for a few days to make it possible to get over them with wagons and buggies.

We should take time to remember these unselfish people who left their work on the farm, ranch, or in the village to put in hard labor on the county roads—without pay. Generally, the repairs were urgently needed to put the roads in usable condition for another few months. The weather, of course, was an important factor. Rain could undo in an hour what it had taken these men many days to accomplish. Often, after a sudden hard rain, they had to go back and make the repairs again.

The picture shown was taken about 1890 along what is now U. S. 87 from San Antonio to Boerne at Eleven Mile Hill, about one-fourth mile north of the present Lockhill School. These men comprised such a group of early road workers. The picture was loaned through the courtesy of A. H. Gerfers, Boerne, grandson of Gus Eckert, one of the men shown.

Many descendants of these men still live in the Bexar and Kendall County area. They can be justly proud of the contribution made by their forefathers to our system of roads.

Pictured, back in 1890 working on what is now U.S. 87, are left to right, Henry Linn, Alfred Seidenschnur, Dave Brody, Mr. Dietz, Gus Eckert, George Brody, Pete Fey, August Liebe, and Charles Seidenschnur. The man on the far right is unidentified.

AWARDS

The last awards program for the year was held December 4 with 52 employees receiving service certificates.

Two awards in the 35-year category were made, bringing the total number of employees who have achieved this status to 44. Of this number, 31 employees remain active with the Department.

There were 22 awards in the 30-year category, and 28 recipients of the 25-year award.

An estimated 30 per cent of the Department's 13,750 employees have completed ten or more years of service.

35-YEAR AWARDS

District 1
Obe D. Dickey, Senior Maintenance Foreman

District 19
Harry F. Payne, Office Engineer

30-YEAR AWARDS

D-11
Glenn W. Drake, Chief of Field Audits

District 1
Kruger R. Allen, Patrolman
Price B. Rainey, Skilled Laborer
Lorenzo D. Stapleton, Skilled Laborer

District 3
Jess W. Reed, Skilled Laborer

District 4
James M. Harris, District Maintenance Engineer
Lonnie F. Parr, Skilled Laborer

District 7
Everett F. Roe, Senior Maintenance Foreman

Obie D. Dickey receives one of the two 35-year awards.

The other recipient of a 35-year award is Harry F. Payne.

District 8
Zanna H. Anderson, Senior Maintenance Foreman
Fred L. Mangum, Special Foreman

District 9
John W. Nichols, Senior Maintenance Foreman
Johnnie M. Statham, Skilled Laborer
Claude H. Word, Senior Resident Engineer

District 10
Jack Sides, Senior Maintenance Foreman

District 12
Claude Riney, Supervising Resident Engineer

District 13
Homer M. Burke, Skilled Laborer
Emil A. Hessler, Skilled Laborer

District 14
Clyde M. Tucker, Construction Superintendent

District 15
Alton W. Vordenbaum, Senior Right of Way Agent

District 17
Robert Klar, Skilled Laborer
Albert J. Weber, Skilled Laborer

District 20
Arthur B. Middleton, Supervising Resident Engineer

25-YEAR AWARDS

D-5
Samuel L. Huff, Engineer of Bridge Operations
Engelbert A. Jelinek, Engineer of Bridge Design

D-10
Jack M. Jordan, Inventory Manager

D-12
David W. Burleson, Investigator
D. T. Harkrider, Director, Motor Vehicle

D-15
Archie H. Christian, Right of Way Engineer

District 1
Felix L. Stephenson, Supervising Resident Engineer

District 2
Vernie E. Williams, Junior Inspector

District 3
John L. Maroney, Senior Maintenance Foreman

Standing on the steps in front of the Highway Building in Austin after receiving 35-, 30-, and 25-year awards are, front row, left to right: O. D. Dickey, H. F. Payne, K. R. Allen, Z. H. Anderson, H. M. Burke, G. W. Drake, J. M. Harris, E. A. Hessler, Robert Klar, and F. L. Mangum.

SECOND ROW: A. B. Middleton, J. W. Nichols, L. F. Parr, P. B. Rainey, J. W. Reed, Claude Riney, E. F. Roe, L. D. Stapleton, J. M. Statham, and Clyde M. Tucker.

THIRD ROW: Alton Vordenbaum, A. J. Weber, Claude Word, J. T. Beard, G. F. Best, David Burleson, A. H. Christian, I. D. Clark, T. B. Dickson, and C. H. Dreyer.

FOURTH ROW: Dockie Dunaway, D. T. Harkrider, H. F. Hilgers, Sam Huff, E. A. Jelinek, R. L. Jones, W. D. Jones, Jack Jordan, E. O. Kneupper, and J. L. Maroney.

FIFTH ROW: George S. Meyer, D. M. Shannon, F. L. Stephenson, and V. E. Williams.

District 6
- Arnold E. Wenter, Resident Designer

District 8
- Jesse T. Beard, Skilled Laborer

District 10
- Thomas B. Dickson, Chief Inspector

District 11
- Alex M. Lucas, Skilled Laborer

District 13
- Reinhardt B. Trenck, Senior Inspector

District 14
- Felix Neumann, Semi-skilled Laborer

District 15
- Dockie H. Dunaway, Senior Inspector
- Herbert F. Hilgers, Supervising Designing Engineer
- Erhard O. Kneupper, Skilled Laborer
- George S. Meyer, Senior Resident Engineer
- Clarice G. Wood, Senior Maintenance Foreman

District 17
- Charlie H. Dreyer, Skilled Laborer
- Russell L. Jones, Senior Warehouseman
- Dhuard M. Shannon, Senior Maintenance Foreman

District 18
- Ira D. Clarke, Senior Designing Engineer
- Lonnie A. Nixon, Skilled Laborer

District 20
- George F. Best, Resident Designer

District 24
- Clarence A. Haynes, Skilled Laborer

District 25
- William D. Jones, Skilled Laborer

Bird's-eye view of EXPRESSWAYS

THE sum of the parts equals the quantity of the whole. So goes a mathematical axiom taught students at one time or another. And these structures, when considered in relation to the other parts, equal expressways—those vital thoroughfares which have been and are being acclaimed by motorists and engineers alike. In Texas, cost per mile to build an expressway ranges from $500,000 to $2 million. Individual sections have cost as much as $6 million.

Texas' first such project, the Gulf Freeway, was put under construction eleven years ago. Since then, miles of expressway have been built, and there will be more as we build to meet Interstate standards. There are many years of labor ahead before structures such as those shown here will ultimately be duplicated and constructed in conjunction with plans for 41,000 miles of Interstate highways in Texas to smooth the journeys of motorists.

In 1955, the Buffalo Bayou and Buffalo Drive interchange on Interstate 45 (U.S. 75), was completed. Cost: $748,321. The ramp carrying north-bound traffic to the bridge has a 22-foot roadway. Both bridges have 40-foot clear roadways. There is still work to be done at this location.

Still under construction are Buffalo Bayou Bridge and approaches on U.S. 59, Houston (Interstate 10)—a 3,313.08-foot-long structure with two 47-foot roadways. Let in November, 1955, for $2,715,180.23, the project was 91 per cent completed November of this year.

Sweeping across the Colorado River on Interstate 35 (U.S. 81), Austin, is a 1,052 foot, $771,206, continuous welded girder unit type bridge with concrete deck. A four-foot concrete median, steel picket type railing separates two 38-foot roadways. Completed July, 1954, the bridge leads southbound traffic into a structure at Riverside Drive overpassing U.S. 81. This structure is a continuous concrete girder type structure. Vital statistics: vertical clearance under bridge on U.S. 81, 14 feet, 6 inches; length, 177.5 feet; roadway, 38 feet; and, cost, $60,851.

Near the south city limits of Dallas on Interstate 35 (U.S. 75), twin structures span the Trinity River. The structure on the right, originally built by the county in 1910, was reconstructed by the state in 1938 for $225,326. Length of the structure is 2,722.5 feet, and roadway is 24 feet wide. Its twin was completed in 1950 for a total cost of $669,073. Slightly larger than the other, the structure's length on the left is 2,722.7 feet, with a 28-foot clear roadway.

Rail Post Testing

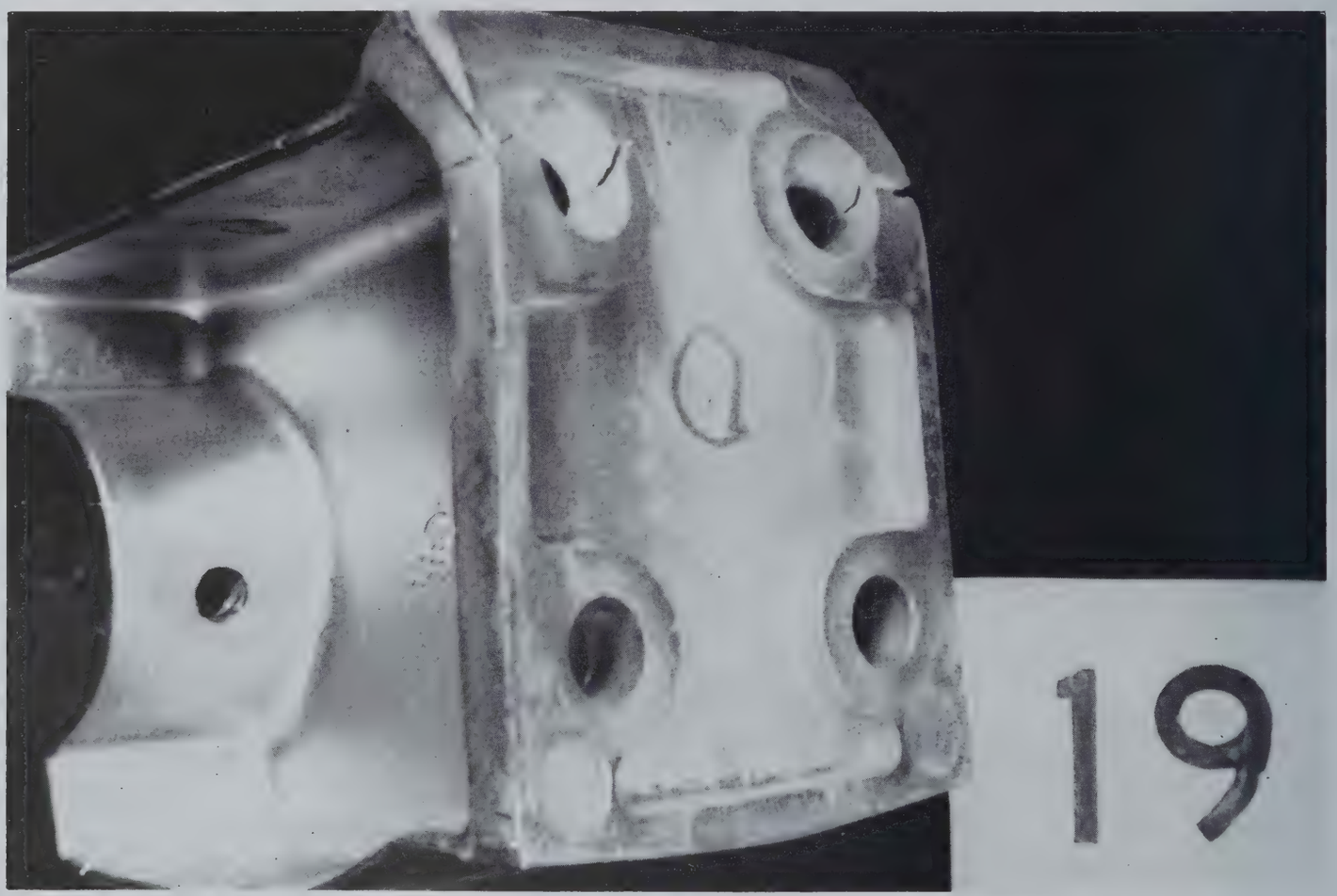
Farland Bundy, Senior Design Engineer
Bridge Division

For many years, the Texas Highway Department has been using steel railing and steel rail posts made from standard rolled shapes of structural steel. This type of railing is present today on a large per cent of our Texas Highway bridges and continues to function satisfactorily. It possesses the strength and toughness required to prevent vehicles from crashing through the railing and, at the same time, presents a pleasing appearance.

The advent of the superhighway in Texas brought about the desirability for these structures to have a concrete parapet wall with a suitable rail mounted on top. Under this condition, it became apparent that a cast post offered some advantages over one built up from structural shapes. A casting could be made more economically and offered greater flexibility of shape and appearance. If the castings were made of aluminum, they offered greater corrosive resistance and, hence, lower maintenance costs than did steel posts. Also, no initial painting is required on these posts.

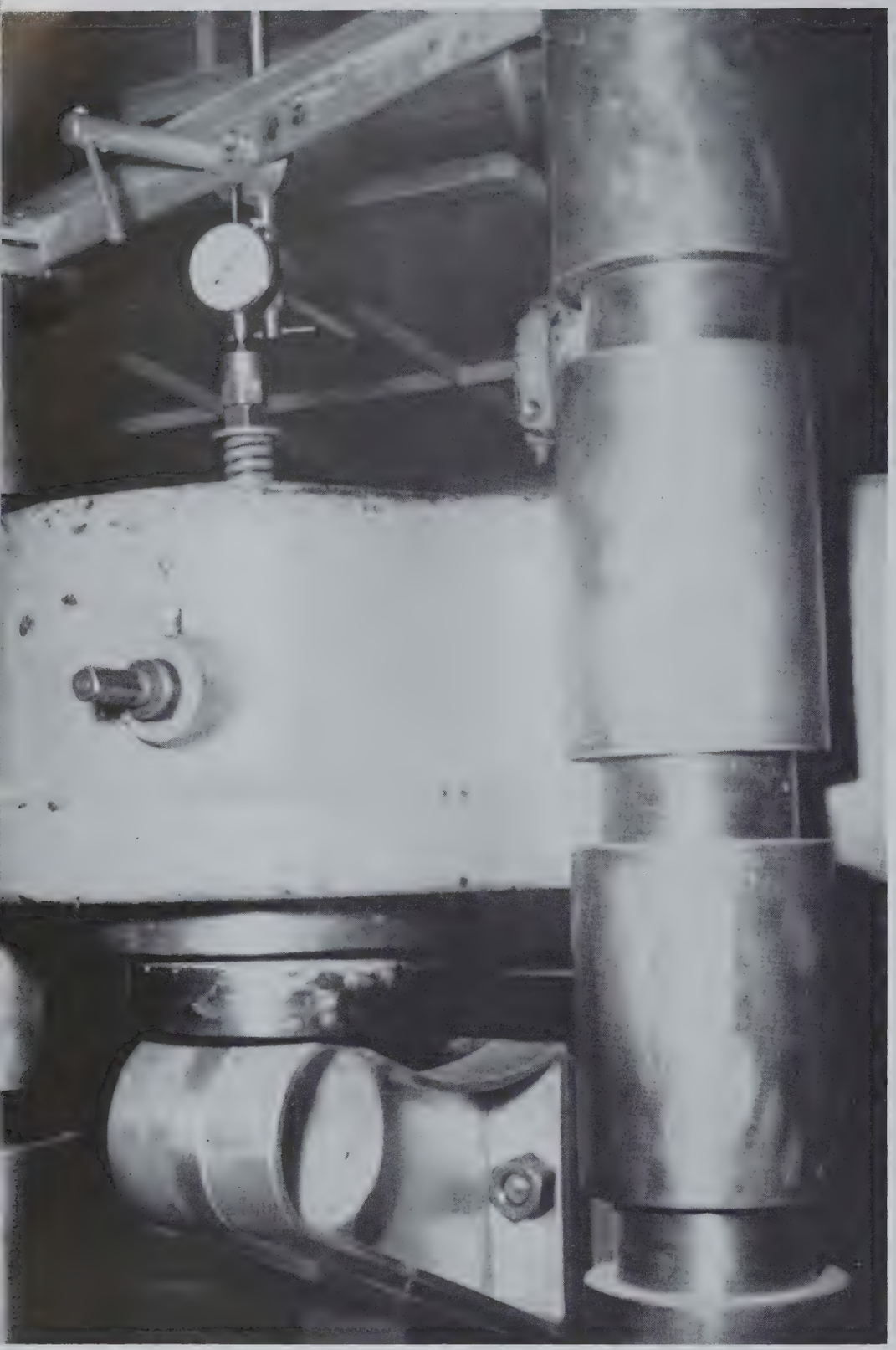
Dynamic testing equipment. A 200-pound ball falls on a mounted aluminum post, simulating the force of a vehicle striking a rail.

Here, the suddenly applied force of the ball has severed the aluminum post from its base.



The impact cracks the mounted aluminum post, causing failure.

A heavily galvanized malleable iron cast post is mounted for testing.



Static testing equipment. Pressure is slowly applied on an aluminum post. Mounted on a heavy L-frame, the post is inserted in a hydraulic machine for testing.

There are, however, certain disadvantages to cast rail posts. They usually do not have the strength or toughness equal to a corresponding size steel rail post. A casting, by its nature, is a less ductile material than a rolled or extruded shape. Certain things can be done to increase the ability of casting to resist shock loading and to make them acceptable as rail posts. These will be mentioned later in the article.

The earliest aluminum rail post installations of any great extent in the Highway Department were made in Houston and Fort Worth. These posts proved to be too brittle and shattered when struck by a vehicle. The Fort Worth Expressway office made some early investigations to determine a suitable alloy and a suitable post shape in an attempt to obtain the ductility needed for rail posts. Through these investigations, they have developed a special post which has proven satisfactory for their needs.

Various aluminum manufacturers have many posts of various alloys and shapes available for our bridge railing, yet very little is known about the impact resistance of these posts. It became apparent that some method of physical testing had to be developed and applied to these posts to determine whether or not they would be acceptable for use in our bridge structures. Furthermore, if this testing was to be realistic, it had to simulate a vehicle striking the post. A procedure was devised to test a post subjected to both a suddenly applied load and a slowly applied load.

The suddenly applied, or dynamic, load was achieved by dropping a 200-pound ball on a mounted post. (Accompanying photos show the arrangements for this test.) A jig was made to allow the ball to be dropped onto the mounted posts from any height up to a maximum of eleven feet. For the first drop, the ball was dropped on the post from a relatively small height. For each successive drop the drop height was increased until the post either cracked or failed completely.

The static testing mount consisted of a heavy L-frame with the post mounted on the vertical leg of the frame. This arrangement was inserted in a hydraulic testing machine and load was applied slowly until the post failed. Deflection measurements were made and recorded for all stages of the loading. For both types of tests, all posts have been mounted on one-eighth-inch-thick neoprene pads. In general, posts so far have been tested in pairs, one being tested statically and another of the same alloy and shape, dynamically. Approximately 40 posts have been tested thus far.

The steel industry has developed a malleable iron cast post which is being considered for use in the same way as the aluminum castings. This post is heavily galvanized to protect it from corrosion.

We are attempting to arrive at a design criterion for rail posts which will be more realistic than our present AASHO specifications. A strength requirement alone is not a sufficient basis for judging the adequacy of rail posts. Some requirements should be set up on the impact absorption characteristics of rail posts since this is the type of load they can expect to receive in service.

The following conclusions have been reached with regard to cast rail posts:

1. The one-eighth-inch neoprene pad between the base of the post and the mount increases the impact resistance of the post.

2. Variations in alloys and heat treating of some alloys add to their impact resistance.

3. Modifications in post dimensions, thicknesses, and shape, to allow for some buckling in the post will also add greatly to their impact resistance.

4. Die-cast aluminum posts are not satisfactory.

5. From the data thus obtained, it appears that both aluminum cast posts and malleable iron cast posts can be made to perform satisfactorily as a bridge rail post when mounted on a parapet wall approximately fifteen inches (minimum) in height.

Dick Schotz, Bridge Division, adjusts the static testing equipment. Deflection measurements were taken from the Ames Dial (below his right hand) until the post failed.

There are many unknowns in correlating the impact testing of bridge rail with a vehicle actually striking the rail. Some of these are, 1) angle at which automobile strikes railing, 2) amount of impact taken by curb, by parapet wall, and by rail, and 3) speed of vehicle (at time of contact with rail) which rail post should be expected to resist.

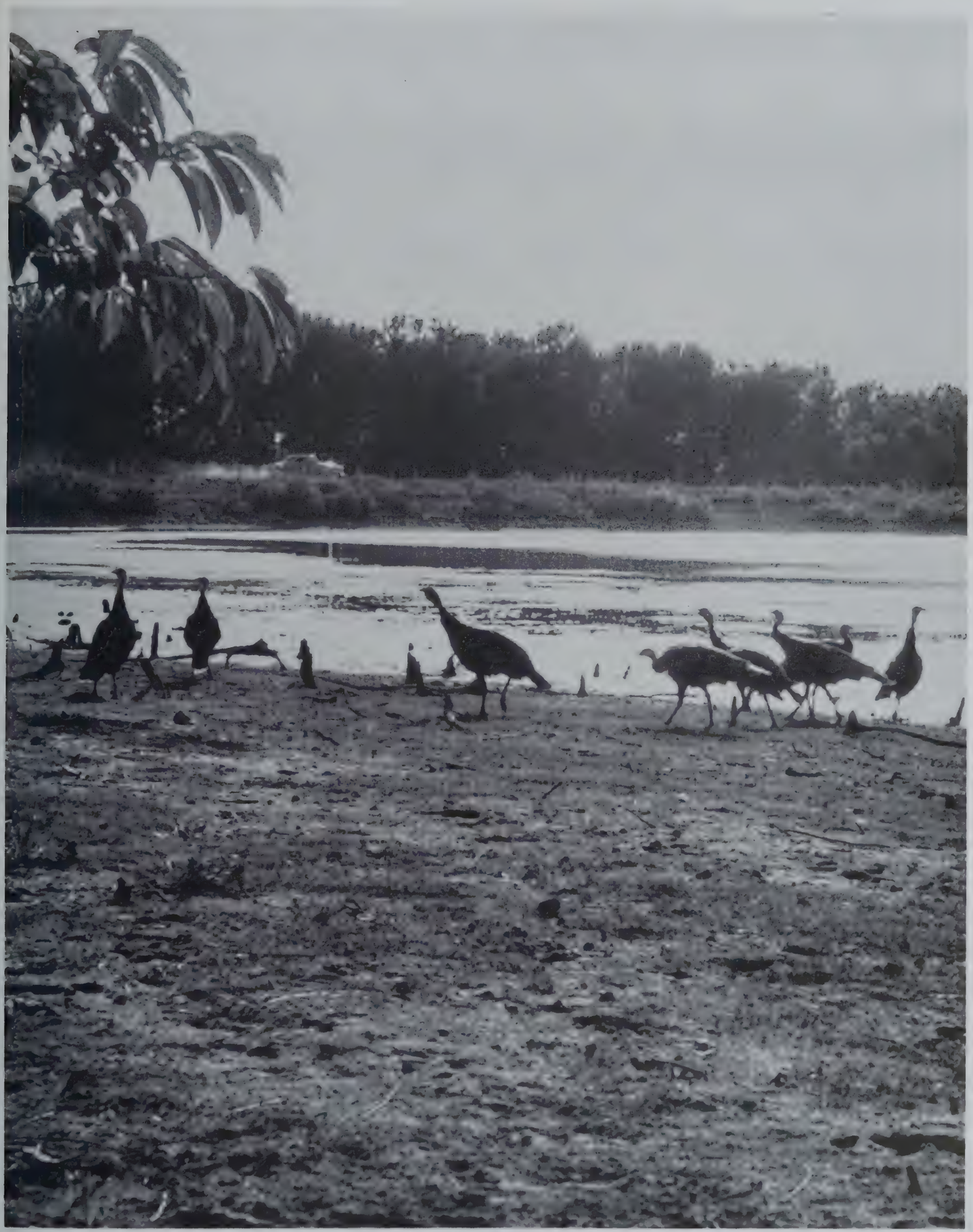
More tests are anticipated in the near future for modified post designs. We hope eventually to set up standards which must be met by all rail posts before they can be used on our highway bridges.

Gordon K. Shearer
Historian, Texas State Parks Board

If you think you know Texas, test yourself on these photographs. Not more than one person in ten can place this spot correctly on a map of the state. It is in a part of Texas generally described as flat, treeless, and shy on surface water and animal life. Yet, it has so many trees that it is under supervision of the U.S. Forest Service. It has enough shelter to make it a habitat of wild turkeys and deer. It has a 75-acre lake with good fishing.

Give up? It's Lake Marvin in Hemphill County, one of the tiers of Panhandle counties, next to the top. So great are its recreational possibilities that it has been voted acceptance as a site for a 578-acre state park, when title transfer from the U.S. Forest Service is accomplished. Already, it is heavily used for picnicking, boating, fishing, and other recreation.

To reach it, travel east on transcontinental U.S. 60 about two miles from Canadian and turn onto well-paved FM Road 2266. Lake Marvin is easily accessible to north and south traffic from U.S. 83, with which U.S. 60 intersects at Canadian.



Dingwall Named Assistant State Highway Engineer

J. C. Dingwall, who for two and one-half years supervised construction of the Dallas-Fort Worth Turnpike, returned to the Highway Department January 1 as Assistant State Highway Engineer.

This office, according to State Highway Engineer D. C. Greer, will carry the duties and responsibilities of the State Highway Engineer during his absence and will carry the direct line of authority from the State Highway Engineer to the organization.

Called "Ding" by close associates, the graying, 5-foot, 11-inch engineer had 27 years of service with the Department prior to June, 1955, when he transferred to the Texas Turnpike Authority as Engineer-Manager. Dingwall had been Engineer of Road Design Division for four years previous to his transfer.

Dingwall joined the Department in 1928, fresh out of Southern Methodist University where he studied civil engineering. His first assignment was in Abilene as lab assistant. Since then, Dingwall has held eleven other titles, and has worked throughout the state. During his early highway career, Dingwall specialized in the construction of concrete pavements, chiefly in Abilene, Amarillo, and San Antonio.

Before coming to Austin in 1950 as head of Road Design Division, he was supervising urban engineer on the Houston Urban Expressway.

Dingwall has had only one other leave of absence from the Department and that was for a three-year stint with the army in World War II. As a major in the Corps of Engineers, he built air bases—in Laredo, Brazil, and Guatemala.

Dingwall is married and has two children. He is a member of the National Society for Professional Engineers and American Society for Civil Engineers. Last year he was made national director of American Bridge, Tunnel, and Turnpike Association. He is a member of Westminster Presbyterian Church. Dingwall is also quite a fisherman!

J. H. Davis, formerly with the Turnpike Authority in Arlington, replaced Dingwall as Engineer-Manager of the Turnpike Authority. The Austin office of the TTA has been closed, and personnel have been moved to the Turnpike Administration building north of Arlington.

OVER THE HIGHWAYS

Comments . . . from the Traveling Public

I like the Spanish governor's palace and San Jose Mission in San Antonio, the skyline at dusk in Dallas, and the extremely helpful information on Mexico given me by Information Bureau personnel. The garage at Sanderson, Texas (where I had car trouble), was also very helpful.

But . . . the heat! the desert! and the maudlin atmosphere at the Alamo (in San Antonio)! In reality, Texans stole the area from Mexico and act as if God gave it to them. Texans win a battle and it's a glorious victory; Mexico wins a battle and it's a vicious, cruel massacre of heroic, angelic Texans! Nuts!

(Miss) E. Latter
Philadelphia, Pennsylvania

• *Careful, ma'am! Us Texans are slow to rile, but you're treading on mighty dangerous ground.*

We visited thirteen states during our vacation and have never seen such "warmhearted," accommodating folks as the ones in Texas. A BIG state with BIGHEARTED, friendly people.

Al Kalajainen
New Castle, Pennsylvania

Texas shouldn't be called a state. To us it's a country!

W. R. Haenggi
Huntington Beach, California

A Texas blizzard caught us in Van Horn. Please don't do this to us next time. We could have had that in Michigan.

Rev. Earl I. and Mrs. Prosser
Eaton Rapids, Michigan

Roads in Texas were fine until the Atlantic Lake in East Texas. The ship from New York to France was a little rolly polly, and the roads in the French section of Texas by way of Paris were not so good, but we are now at home Charmont (?), France, East Texas, and hope to make the trip back to West Texas, Laredo, very soon.

Bernard R. Daugherty

We liked your beautiful state. All you need is 20 million more good Americans and 4 million good early willing farmers to cultivate the land. Maybe that will happen later when we get hungry.

Theo. D. Vellia
Seattle 2, Washington

Your modern stores, by-passes around towns, highway markers and signs, city expressways, fine cafes, good food, friendly people, mild weather, splendid roads, grand golf courses, clean motels, clean service stations, and careful drivers were wonderful.

DeSoto, Missouri

Thanks so much for the use of your very nice roadside tables all the way through Texas. We recently traveled from Florida to North Carolina through to El Paso and across to Houston. Of all the states we went through, your roadside tables were the nicest and cleanest, even to providing wood for the grill.

We noticed that all the tables marked "We hope that the previous guests left this table as you would like to find it" were all left in excellent condition. So therefore, a good suggestion.

The Taylors
Pompano Beach, Florida

In another ten days we will be leaving the good state of Texas, as our vacation is just about ended. We have had a wonderful time here on the Gulf; in fact, everywhere we went.

We entered Texas at Denison where we got our first information on roads. Since we are traveling with a 35-foot house trailer, road information is quite important to us. At Denison, we were given a marked map of the highways and the mileage to our destination. The highways were 100 per cent which made our trip shorter and more pleasant. My hat is off to the Texas Highway Department. . . .

Mr. and Mrs. George Fawcett
Corpus Christi, Texas

To and From Our Readers

The literature you were good enough to send me will be very helpful.

In one of your booklets, I read that the name "Texas" has its origin in a spanish word meaning "friendly." My short experience is the Texans live up to it. "Noblesse oblige." And I want nothing more, now, than for my experience to become a long—a very long one!

J. Devaurex
Geneva, Switzerland

I would like very much to beg, borrow, steal, or even buy an Official Highway Travel Map of Texas.

Name your terms, but I would appreciate your sending me the map.

H. J. Miller
Denver, Colorado

Some time ago I obtained an excellent 1952 Official Highway Travel Map of Texas. . . .

If there is a recent travel map, I would appreciate your sending me a copy. Frankly, you are making such improvement changes that when I come to Texas each year, I am lost most of the time.

Incidentally, it is interesting to see the vast changes in as much as I started traveling out of Wichita Falls over 30 years ago. I went as far west as Spur and south to Haskell and Rule. The hard-surface roads I had ran from Wichita Falls to Electra and up to Burkburnett. Love Field in Dallas was way out in the country and Arlington was an independent town in its own right.

Again, I'll appreciate a late map if such is available.

Russell H. Kellogg
Boone, Iowa

"Did you know that last year eight million tourist came to Texas and said that they enjoyed the nice clean roadsides?"

About the Cover . . .

The Fratt Interchange, completed January, 1957, at a cost of $2½ million, smoothly and swiftly expedites traffic into San Antonio from the northern city limits. Besides the Fratt Interchange, one of the largest in the state, there are five three-level interchanges, and one four-level interchange in Texas, all of which are designed as major safety features.

In the background, running north and south, is Interstate Highway 35, part of the proposed deluxe highway system which already carries more than 20 per cent of the traffic in the state. Connecting with Interstate Highway 35 from the west is U. S. 81 and Loop 13, foreground.

Photograph by Douglas Fairchild.

TEXAS HIGHWAY COMMISSION

MARSHALL FORMBY	**Chairman**
HERBERT C. PETRY JR.	**Member**
CHARLES F. HAWN	**Member**
D. C. GREER	**State Highway Engineer**

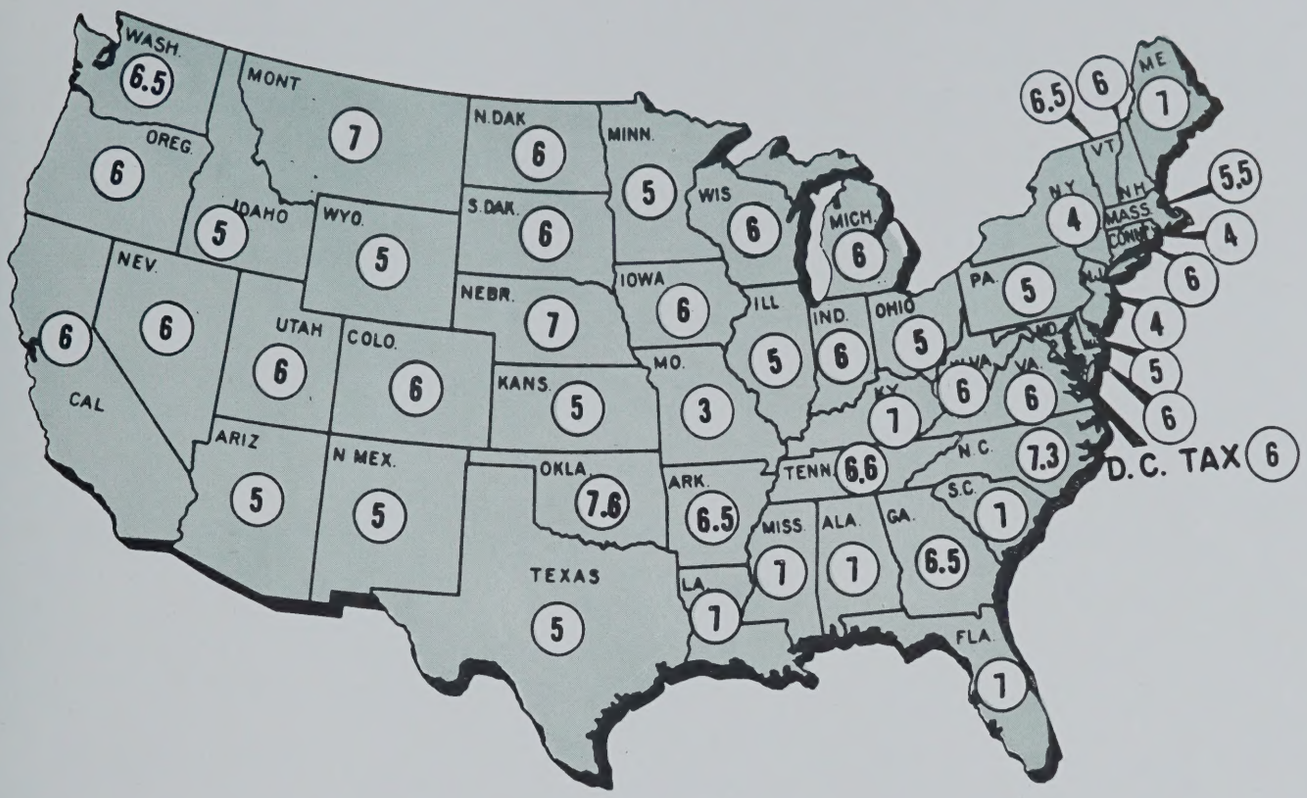
Texas Highways

TEXAS HIGHWAYS, official journal of the Texas Highway Department, is published in the interest of highway development in Texas and for departmental education in the improvement of construction, maintenance, and operation.

All material and manuscripts should be directed to the Editorial Office, Division of Information and Statistics, Texas Highway Department, Austin 14, Texas.

STATE GASOLINE TAXES...

These taxes are in addition to the 3c Federal tax



A nation-wide survey shows that fourteen states have revised their state gasoline tax since 1956. Ten (Utah, Nebraska, New Jersey, Vermont, Massachusetts, New Hampshire, Oklahoma, North Carolina, Indiana, and South Dakota) have raised the rate, while four (Idaho, New Mexico, Tennessee, and New York) lowered their tax. Per state, the average gasoline tax is 5.9 cents a gallon.

Only four (Missouri, New York, New Jersey, and Rhode Island) have a lower rate than Texas while 33 states plus the District of Columbia rank the Lone Star State. Ten states share 35th place with Texas on the tax totem-pole. Beside the highway fund, twenty-eight states have a certain amount earmarked for other purposes; namely, county and city support, including Texas, which designates 1¼ cents for schools, ½ cent for counties, leaving a total of 3¼ cents out of the total 5 cent gas tax for highway purposes.

STATE	TOTAL STATE TAX	TOTAL TO HIGHWAY FUND
Alabama	7c	3c
Arizona	5c	3.5c
Arkansas	6.5c	3.5c
California	6c	6c
Colorado	6c	3.9c
Connecticut	6c	6c
Delaware*	5c	
Florida	7c	4c
Georgia	6.5c	6.5c
Idaho	5c	3.5c
Illinois	5c	1.8c
Indiana	6c	3.2c
Iowa	6c	3.7c
Kansas	5c	4c
Kentucky	7c	5c
Louisiana	7c	5.5c
Maine	7c	7c
Maryland	6c	3c
Massachusetts	5.5c	5.5c
Michigan	6c	2.8c
Minnesota	5c	5c
Mississippi	7c	4.5c
Missouri	3c	3c
Montana	7c	7c
Nebraska	7c	4.3c
Nevada	6c	4.5c
New Hampshire	6c	6c
New Jersey*	4c	
New Mexico	5c	3.8c
New York	4c	4c
North Carolina	7.3c	7c
North Dakota	6c	6c
Ohio	5c	3.3c
Oklahoma	7.6c	4.8c
Oregon	6c	4.3c
Pennsylvania	5c	4.5c
Rhode Island*	4c	
South Carolina	7c	6c
South Dakota	6c	5.3c
Tennessee	6.6c	2.9c
Texas	5c	3.3c
Utah	6c	6c
Vermont	6.5c	6.5c
Virginia	6c	6c
Washington	6.5c	6.5c
West Virginia	6c	6c
Wisconsin	6c	6c
Wyoming	5c	2.6c
District of Columbia	6c	6c

* Motor fuel tax receipts are deposited to General Fund and Legislative appropriations are made for operating the Highway Department.